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ABSTRACT

The relationship between developing oral language skills and reading skills was examined in a study involving 65 fifth and sixth grade children. The subjects' reading ability was tested on the comprehension and accuracy scales of a standardized reading test. The oral language measure was a recall task for verbal material of varying linguistic content. The results showed that skilled readers differed from poorer readers in their use of semantic and syntactic information rather than in verbal memory span and that there may be no general relation between oral and written language but rather relationships between specific language variables and specific reading tasks. In addition, the ability to utilize syntactic information appeared to be a performance-limiting factor in reading comprehension. The findings suggest that some children may fail to progress in reading because they are delayed in the ability to recognize and exploit syntactic structure. (Author/FL)

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LINGUISTIC STRUCTURE, MEMORY AND READING

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It is agreed, fairly universally, that a reader's knowledge of the linguistic rules of his language assists him in understanding printed prose (e.g. Smith, 1973). This knowledge may be utilized even by the beginning reader as early as the first year of instruction (Doehring, 1976) but is exploited to a greater extent by more proficient readers (Holmes, 1973). Since the shift to more linguistically-directed reading strategies (Gibson and Levin, 1975) parallels the development in the use of structure in oral language (Frasure and Entwisle, 1973), this suggests that the acquisition of reading skills may be dependent on or developed through some previously acquired language skills. The relationship between developing oral and written language, however, is not well documented. The present study was designed to examine this relationship by comparing the performance of older grade school children on both reading and oral language tests.

Sixty-five children enrolled in regular grade 5-6 classrooms in working-class urban public schools participated. Their mean age was 11.4 years and their mean I.Q. as assessed on the Kuhlman-Anderson group test was 90. Their reading ability was tested on the Comprehension and Accuracy Scales of the Gates-MacGinitie Reading Tests. The scores ranged from grade 2.5 to grade 11.6 with a mean of just under grade 5 on both scales.

The oral language test was a recall task for verbal material of varying linguistic content. The paradigm was first used with adults

by Miller and Isard in 1963 and in developmental studies done by Frasure and Entwisle in the early '70's.

My recall test materials were more varied both structurally and lexically than those used in the earlier experiments. Three sets of word lists were constructed: meaningful grammatical sentences, anomalous sentences which retained the same phrase structures as the meaningful sentences but violated standard semantic rules of English and random lists which were formed by randomly permuting anomalous strings. All lists were six words in length, based on six different syntactic structures. Examples of the word lists are shown in Table 1.

Insert Table 1 here

The word lists were tape-recorded, the words spoken without stress or intonation at the rate of approximately one word per second. Each test tape contained 36 lists, i.e. two examples of each list-type X structure combination. The task was presented as a "game with sentences" and the child was instructed to "say the sentence right back" after hearing it.

The children's performance on each of the list types was scored for number of words recalled in the correct order. The lists, as you have heard, differ in the extent to which they contain semantic and syntactic regularities. For a subject who has knowledge of the structural possibilities of English and the acceptable word combinations, these regularities may facilitate recall. Without this knowledge,

all lists should be equally difficult.

So the three test measures allow us to examine the relative contributions to reading of three different psycholinguistic abilities. Performance on random lists which follow no linguistic pattern may be considered a measure of verbal memory span. Structured lists scores are potentially measures both of verbal memory plus some additional linguistic competance, use of syntactic cues in the case of the anomalous lists, use of semantic as well as syntactic cues in the case of the meaningful lists.

All three recall measures, both reading measures and I.Q. were intercorrelated.[1] In order to sort out the relationships, we had to examine some partial correlations. These are shown in Figure 1.

The top half of the figure

Insert Figure 1 Here

shows the relationship between I.Q., recall scores and reading ability as assessed by the Comprehension Scale, while the bottom half shows the relationships between the same variables and reading accuracy. The solid bars represent the zero order correlations, the patterned bars partial correlations, each pattern indicating a different controlled variable.

There are three sets of relationships I want to comment on. First, you can see that verbal memory is related to reading either through I.Q. or through structured list recall. When I.Q. or structured string scores are partialled out, the random string scores no longer relate to reading except in the one relationship with reading comprehension. Conversely, partialling out random string scores lowers

only one relationship below the significance level, the correlation of anomalous string scores to the accuracy scale. The factor that distinguishes skilled from less skilled readers is not verbal memory span but rather knowledge of linguistic use, or at least the tendency to use this knowledge.

The second set of relationships further delineates the nature of the capacities we measured. These linguistic capacities correlate with but are separable from general intelligence. Both are independantly related to reading. The correlations between either I.Q. or structured list recall and reading are still significant when the other is partialled out. At any given level of intelligence, a more linguistically able child can be expected to be a better reader.

The third set of relationships provide a caveat against doing what I've done so far, mainly making broad statements about reading and language. The two structured list types related differentially to different reading measures. Recall of meaningful lists relates to the Accuracy Scale independantly of the other scores, recall of the anomalous lists relates to the Comprehension Scale independently of the other scores. There may be no general relation between oral and written language but rather relationships between specific language variables and specific reading tasks. The relationship between any oral language score and any reading test score probably depends on the exact priorities of the reading rask, tapped by that measure of reading skill.

In the time remaining, I want to focus on some findings related only to reading comprehension which illustrate that point. We were

particularly interested in the magnitude of the differences in performance between the three string types because we know that the recall advantage provided by linguistic structure shows developmental changes. That is, for very young children, all three scores are identical, but gradually linguistic information comes to be used. So these differences or lack of differences can be an index to development.

My data were remarkably consistant with regard to order of difficulty, with meaningful lists easiest and random lists hardest. There were only the two deviations from this order. All of the children did use structure both semantic and syntactic to help them remember. They did not all do so, however, to the same extent.

Because of the statistical problems involved in using difference scores, we used residual change scores as outline in Glass and Stanley (1970). We found no relationship between the meaningful-anomalous differences and reading. ($r_{xe_{y.z}}$ = .183, N.S. where x = reading comprehension, y = meaningful string score, z = anomalous string score). This is, children at different levels of reading competance were equally able to use semantic cues to facilitate performance. There was however, a significant relationship between anomalous-random differences and reading. ($r_{xe_{y.z}}$ = .305, $p < .05$). The extent to which children used syntactic cues varied and was related to reading ability.

Compare these findings with those of Frasure and Entwisle's (1972) developmental study. They found the facilitation effect of semantic information remained stable after first grade. Children of different ages were equally able to use semantic cues. The performance increments

associated with syntactic information increased between first and third grades, like the increment increase between poor and good readers. Thus there is an analogue between older and younger children, skilled and less-skilled readers. Poor performance could indicate a lag in the development of a linguistic competancy that normally manifests itself in the early school years.

Why is this particular competance a performance-limiting factor in reading comprehension? We suggest that this developmental delay is related both to performance on the recall task and on the reading test because both have a similar task requirement, namely the need to organize verbal material into meaningful units. We know that some poor readers have difficulty comprehending because they read word by word rather than in phrases or larger units. Some poor readers process oral language one word at a time as well, at least in the context of our experimental task.

At the SRCD meeting in New Orleans last month I presented a detailed comparison of the recall patterns of the 20 best and 20 poorest readers. The poor readers showed a much greater tendency to handle all word strings as if they were random lists, i.e. there was no evidence of organization into units. Only on the meaningful sentences particularly those which had the simplest structure did they form some multiword word units. Where these were smaller than the whole sentence however, they seemed to have been based on criteria other than the usual syntactic divisions that one would expect to find which we did find in good readers. These idiosyncratic units are not optimally efficient either for recall or for reading.

Our experimental task materials, like graphic language lack the supra-segmental features such as intonation, stress, and irregular pause durations which augment linguistic regularities in normal oral speech and provide preformed divisions. The child faces the job of dealing with material which has no overt organization. Some children have a repetoire of varied language structures which when mapped onto parallel verbal material provide ready-made encoding units to reduce the memory load on the experimental task and to divide print into units appropriate for semantic processing. Others of the same age apparently do not. Thus, some children may fail to progress in reading because they are delayed in the development of the ability to recognize and exploit syntactic structure.

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Footnotes

[1]These correlations are shown in Table 2. The

Insert Table 2 Here

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means and standard deviations of these variables as shown in Table 3.

Insert Table 3 Here

Table 1

Sample Recall Test Items

	List Type		
Structure	Meaningful	Anomalous	Random
Conjunction	Weeks and months pass by quickly	Gardens nor flies sold dark pounds	Office ill mean world heart or
Object somplement	Farmers need to plant every spring	Stores hate to sleep toward picnics	Public to follow eggs dollars applied
Adjective	Clean white snow covered our city	Hard cheap summers cry proper furs	Signed address short into plan red
Verb Auxiliary	Good cooks must have measured oil	Flowers would have sailed recent chickens	Could morning wishes silk offered have
Quantity	Some of these marbles rolled away	Enough of burned sound saw last	Big little set apple of party
Relative clause	Your lady who coughed is sick	Group boards which used know back	Took own ideas today which still.

Table 2

Correlations between Recall Test Scores, Intelligence and Reading

Variable	1	2	3	4	5	6
1. Meaningful lists	---	.654*	.620	.246	.391	.441
2. Anomalous lists		---	.759	.415	.352	.462
3. Random lists			---	.310	.307	.346
4. Intelligence				---	.443	.405
5. Reading Accuracy					---	.637
6. Comprehension						---

* $r \geq .211$, $p < .05$; $r \geq .295$, $p < .01$; $r \geq .325$, $p < .005$

Table 3

Performance on Recall Test, I.Q. Test and Reading Test

	Variable	Mean	Standard Deviation
1.	Meaningful lists	4.80	0.91
2.	Anomalous lists	3.33	0.98
3.	Random lists	2.40	0.88
4.	Intelligence	90.00	14.92
5.	Reading Accuracy*	15.05 (4.9)	4.77
6.	Comprehension*	32.45 (4.7)	9.44

*These means are based on raw scores. The grade-level equivalents are given in ( ).

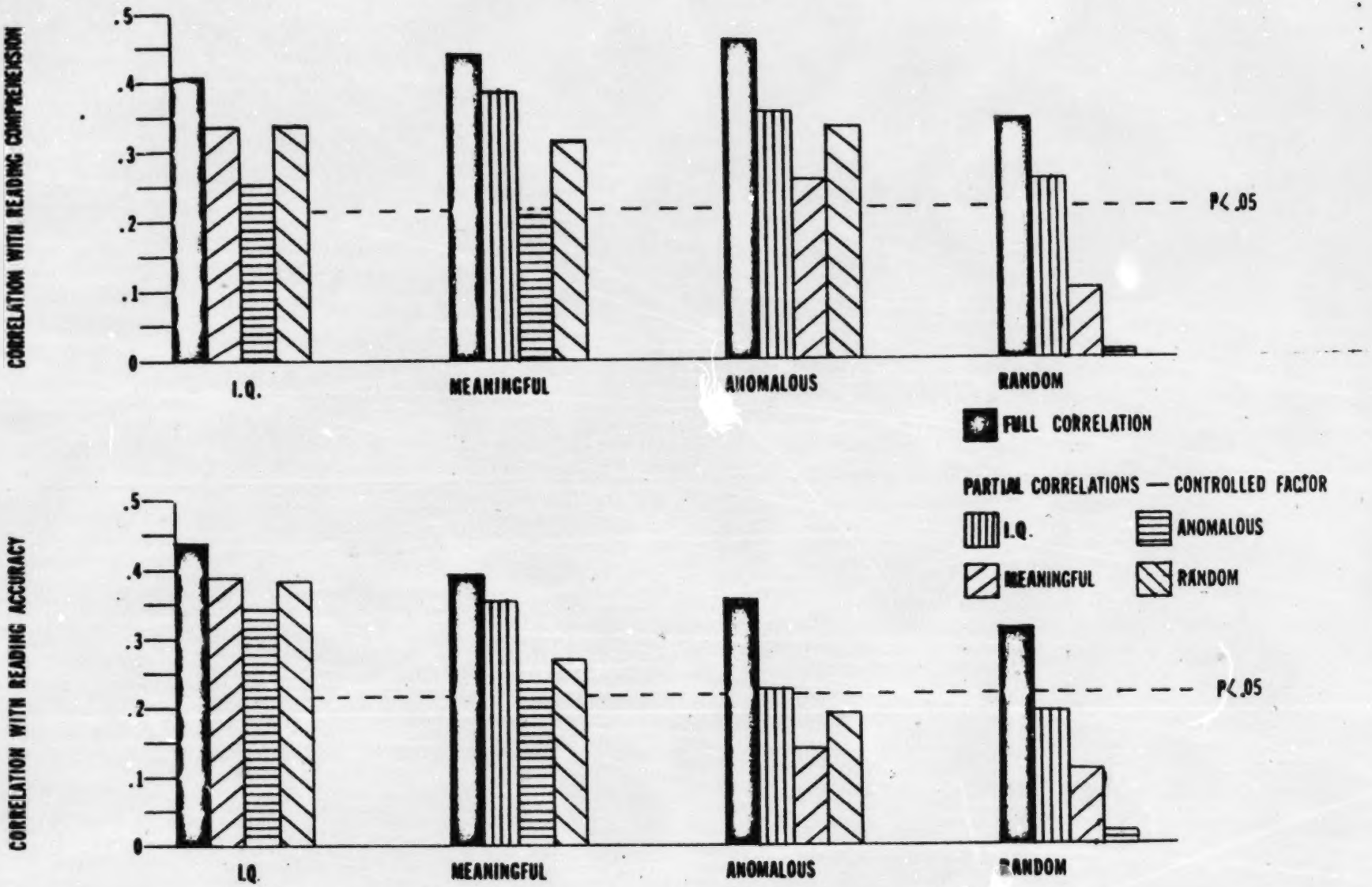

figure 1

CORRELATIONS BETWEEN RECALL TEST SCORES, INTELLIGENCE AND READING